Knowledge Transfer in Practice
A Socio-technical System for the Transition in Outsourcing

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Abstract: This paper argues that knowledge transfer is a key of success of an outsourced Information System Development. In this study we investigated the role of a Socio-Technical System for managing different types of knowledge in the transition stage of an outsourced information system development (OISD). In the transition stage the outgoing service provider transfers the project to an incoming one. Transferring the project means transferring not only materials (documents and code) but also knowledge. The socio-technical system permitted us to provide good practices for the transition stage and a tool built from scratch, one that would have the required flexibility and still be user friendly. We discuss observed effects and limitations of our Socio-Technical System.

1 INTRODUCTION

The aim of this paper is to develop a socio-technical system for managing different types of knowledge in the transition stage of an outsourced information system development (ISD). During this transition stage, the outgoing service provider transfers the project to an incoming service provider. A considerable number of organizations had negative experiences with this transition stage. We focus on this transition stage due to its significance for outsourcing success, its complexity, and its limited current understanding. We investigated what is the impact of knowledge transfer processes on this transition stage and, in turn, on outsourcing performance? Transferring the project means transferring not only materials (documents and code) but also knowledge. Many scholars showed the existence of two dimensions of knowledge which consist of tacit and explicit knowledge. The explicit knowledge is relatively easy to codify, share and to transfer. But the tacit knowledge is abstract and can be communicated only through oral exchange. Generally speaking, managerial and business process, expertise, routines are more tacit than product development, production, and technology.

The literature shows that knowledge management, specifically knowledge transfer, is a key of success of the outsourced project. We distinguished in the Knowledge Management literature two main approaches: (1) a technological approach and (2) a managerial and sociological approach. Second approach proposed a socio-technical system which permitted to manage explicit and tacit knowledge. We extend the socio-technical system to permit us to provide good practices for the transition stage and a tool built from scratch, one that would have the required flexibility and still be user friendly.

Our case study concerns the CIO of a French Public Scientific and Technological Institutions (PSTI). Since ten-year, French Public Scientific and Technological Institutions focus on their primary business, that is to say research, and outsource their support services like e.g. Human Resources, Finances, or Information System (IS). The CIO's job, partly consisting in the conception and the implementation of new applications. But, now the information system development is outsourced. The outsourced ISD implicates three participants: two internal participants who are the CIO and the business direction concerned by the IS, and an external participant who is software and computing Services Company also called service provider. This

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provider is chosen at the end of an invitation to tender. In PSTI, government contract rules concerning outsourcing impose a (re-)call for tenders on a contract at least each three years. Then each invitation to tender can lead to change the service provider during the project. This change necessitates performing a *transition* stage, during which the outgoing provider transfers documentations, applications, codes and *knowledge necessary to the project performance* to the incoming service provider. The paper is structured as follows. The next section (Section 2) presents the transition phase of an outsourced ISD. In Section 3, we put down background theory; we introduce a technological, managerial, and socio-technical Knowledge Management approach within organizations, we discuss knowledge transfer according to the literature and we sketch out the architecture of an enterprise's information and knowledge system (EIKS). In section 4, we present our experimentation and case study. We discuss our finding in section 5 and present conclusions.

2 THE TRANSITION STAGE IN AN OUTSOURCED ISD

(Loh and Venkatraman 1992) defined IT outsourcing like this: "IT outsourcing refers to contracting certain (or all) activities related to an IT function, such as software development, testing and maintenance etc., to an external vendor". An IT outsourcing relationship can be broadly divided into six stages: Initiation, Vendor Selection, Contract Negotiation, Transition, Service Delivery and Termination (Contract Renewal/Change Vendors/Internalisation) (adapted from Lacity and Willcocks 2000). We distinguished tree types of transition (Figure 1).

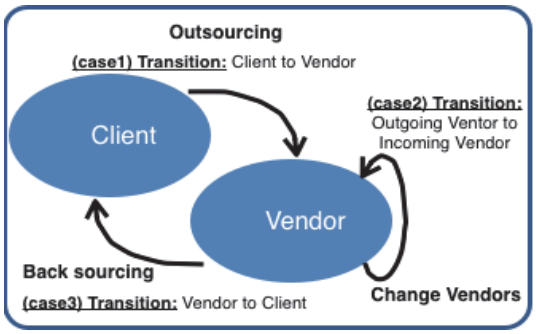

Figure 1: Transition cases and outsourced ISD.

The transition stage is defined as a stage with a limited duration in which knowledge, experiences and routines related to the outsourced activities are transferred from client to vendor (case1). The knowledge, experiences and routines transferred serve as the foundation for delivering services throughout the contractual duration. Sometimes, in the termination stage client decides to change providers. Experiences and routines are then transferred from outgoing vendor to incoming vendor (case 2). If the contract is over but not the IS Development then a re-call for tenders is processed. If the re-call for tenders leads to the choice of a service provider different from the outgoing one then the outsourced ISD has to be transferred from the outgoing team provider to the incoming provider. If this re-calls for tenders' leads to the choice of the same service provider then protagonists of the project are usually unchanged; the project goes on without transition phase; it's Contract Renewal. The third case of transition (case3) is when the client decided to internalize the outsourced information system development, in the termination stage. The process of bringing IT operations back in-house after they have been outsourced as the outsourcing contract expires or is terminated is termed 'Back-sourcing' or 'Insourcing'. Although this may be a temporary trend in some organizations, there is limited understanding of the future effects of such a move and the extent to which a back-sourcing strategy will positively or negatively influence a firm's innovative capability (Beardsell, 2010).

We focus on the transition stage for two reasons: First, industry sources claim that two-thirds of all failed outsourcing relationships can be traced back to transition (CIO, 2007), suggesting that it has a strong influence on the success of an outsourcing relationship. Second, despite being a critical stage in an outsourcing relationship, the current understanding of transition is poor due to the limited academic attention it has received (Schott 2011); (Al-Salti et al., 2010).

3 THEORETICAL BACKGROUND

Knowledge Transfer during outsourcing have been found to have a significant impact on relationship success (Dibbern et al., 2008); (Lacity and Rottman, 2008); (Hirschheim et al., 2009). Before considering knowledge transfer, let's recall some classical and fundamental notions concerning knowledge.

Knowledge is defined as being justified true belief (Nonaka and Takeuchi, 1995). We agree with the vision considering that knowledge is not an object (details in (Grundstein, 2009)). Knowledge is often distinguished between tacit (or implicit) knowledge and explicit one (Polanyi, 1967). Explicit knowledge can be codified (e.g. writing or drawing) and articulated since it can be expressed formally and systematically. Tacit knowledge corresponds to no explicitable knowledge like e.g. skills, senses, intuition, physical experiences, "job secrets", environmental knowledge concerning clients or technologies. We can differentiate two kinds of tacit knowledge: the individual and the collective one (Nonaka, 1994). The collective knowledge is created and possessed collectively by a group composed of more than one individual. Note that group tacit knowledge is more than the aggregation of each member's individual tacit knowledge (see (Erden, von Krogh and Nonaka, 2008) for details).

Let's now consider the notion of knowledge transfer. Knowledge transfer is the process by which one unit of an organization, such as a group or department, is affected by the experience of another (Argote and Ingram, 2000). Knowledge transfer leads to an increase of shared knowledge that, in turn, may affect performance of receiver. Penrose (1959, p. 76) formulates that "... it is likely that increases in knowledge can always increase the range or amount of services available from any resource." Moreover, tacit knowledge plays an important role in explicit knowledge transfer because tacit knowledge is necessary to the understanding of explicit knowledge (Polanyi, 1975) (Alavi and Leidner, 2001). (Davenport and Prusak, 1998) proposed this definition:

Transfer = Transmission + Absorption (and Use). Please, note here the important distinction between *transmission* and *transfer*. This equation indicates that transmitting knowledge by sending or presenting explicit knowledge is not sufficient for transferring it. A knowledge that is not absorbed (Cohen and Levinthal, 1990) by its receiver is not transferred. Davenport and Prusak (1998) also emphasize on the difference between "knowing" and "doing": knowledge is really absorbed when it can be put into practice. This justifies the "Use" part of the expression.

Knowledge can be acquired not only through structured media, such as documents, but also through informal and/or formal interpersonal interactions (Davenport and Prusak, 1998). Introducing the notion of *Ba*, Nonaka and Konno (1998) indicated that: Physical, face-to-face experiences are the key to conversion and transfer of tacit knowledge (Nonaka and Konno, 1998). Another concept, we introduce is Knowledge management (KM). KM is all practices of an organization to create, store, use and share knowledge (Probst et al., 1998). Knowledge Management includes a managerial and sociotechnical approach which considers knowledge as a resource participating in companies' performance (Grundstein, 2005). The managerial and sociotechnical approach takes into consideration the variety of the situations. It places the constraints of the social system and the specificities of the actors at the heart of its analysis. It is centred on the processes but it does not center them on technological solutions conceivable a priori. Furthermore IT is an indispensable enabler of KM. The managerial and sociotechnical approach is articulated around two purposes:

1) Patrimony purpose aims at knowledge conservation, for its perpetuating and its transfer. It aims also at uncovering tacit knowledge to perpetuate it.

2) Sustainable innovation purpose is complementary to patrimony purpose. It is about encouraging individual knowledge creation, without neglecting its appropriation by the organization.

Based on this approach, (Rosenthal-Sabroux and Grundstein, 2009) proposed the enterprise's information and knowledge system (EIKS) which consists mainly in a set of individuals and digital information systems (Figure 2) as context of KM. EIKS rests on a socio-technical context, which consists of individuals in interaction among them, with machines.

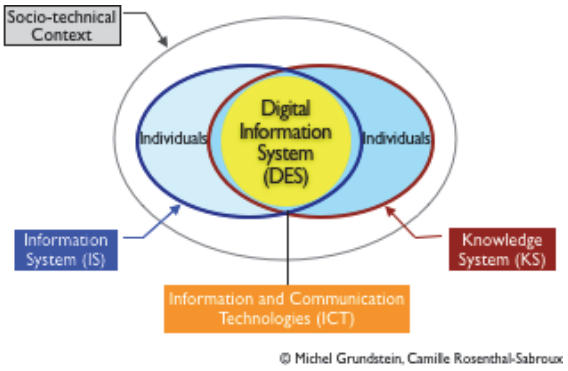

Figure 2: Enterprise's information and knowledge system (EIKS).

Larry Prusak (O'Dell and Hubert 2011) describes some of the main principles focused on knowledge management at the beginning days (p. xi): 1)

Knowledge is a fixed pool, a collection of resources that can be measured and used by standard management techniques; 2) Technology is the key tool to unlock the value of this resource – more technology, the better; and 3) Individuals are the critical unit of analysis in working with knowledge – the more productive the individual is the more knowledge is being used.

4 EXPERIMENTATION AND CASE STUDY

We recall here that the transition phase mainly consists in transferring the outsourced project from the outgoing provider to the incoming provider. One has to note that in the case of an outsourced IS development project in *project management mode*, the service provider "possesses" most of the knowledge necessary to the project. In a transition phase, the IS department does not want to absorb the knowledge. Its main goal is to manage the project transfer from the outgoing service provider to the incoming one. Thus, even if the IS department possesses a part of the knowledge necessary to the project and participates to -and even more manages- the transfer.

In the PSTI we are in contact with, the transition process has to satisfy an important constraint: it has to be performed in twenty (or less) working days. It respects a pre-defined business process during which

- the outgoing provider transmits documentations, applications, codes to the incoming team, and
- the outgoing provider and the ingoing team -and more particularly the ingoing service provider- share knowledge.

This transition process consists in six activities: the *initialization* activity which marks the official start of the transition phase; the *Third Party Maintenance ending* where an inventory of internal and external documents and codes is performed; the *edition and validation of the transfer plan*; the "*knowledge transfer*" essentially consisting in transmitting documentations, applications and codes from the outgoing team to the incoming one; the *maintenance in cooperation* during which outgoing and incoming service providers assume together a maintenance of the application, and the *responsibilities transfer*, which marks the official departure of the outgoing provider. The fifth Activity (the *maintenance in cooperation*) is optional according to the procedure. In practice, this activity is often skipped for cost or time saving reasons.

We distinguished two types of knowledge in the Information System of our case study: Tacit (human mind, routines, experiences, organization), Explicit (document, computer). An Information System is defined as a set of resources used for transferring information within a company. These resources are composed of human beings, hardware, software and even procedures. A "IS Department" is often created to manage the hardware and software part. For the IS Department it is very important to keep a mapping of all hardware and software elements it manage, and furthermore of all links between those elements. It is also essential to know who the person in charge is for such or such element of the IS. Without this detailed mapping it would be difficult, maybe impossible, to predict all the impacts that would cause inserting, removing or updating a part of the IS on the whole. We argues that only storing the IS mapping as a data set would be quite meaningless. Indeed, according to information theory (Aamodt and Nygard 1995) data don't have a signification by themselves; they need to be interpreted to become information. As a result we wouldn't be able to extract anything from those data without knowing the context in which they have been inserted, which would require reading more data. In a traditional software environment, the interpretation is in the source code itself. But we had chosen a flexible approach, one where the modelled domain could be changed without requiring a software update.

Based on EIKS, we decided to try to build our own tool from scratch, one that would have the required flexibility and still be user friendly: - The Digital Information Systems (DIS) is conceived like this: To conceive the database we thought about reflexivity. We were willing to create a system capable of managing both concepts and instances of those concepts, so why wouldn't the system be capable of describing itself? We started to create a UML class diagram representing the concept of concept. We continued by designing a database to store this information. Then we thought about how to link a model of a concept to database tables. Finally we thought about how to link a concept model to database tables. In the end we obtained a database with tables in which to store information about concepts and about the tables used to store instances to those concepts. Unique keys called Object ID identify each concepts and instances. As a matter of fact we consider that a concept is an instance of concept ant that each instance can become a concept. This was also made to increase the flexibility of our system. The User Interface was

mostly done using Javascript technologies. Using AJAX not only allow to reduce stress load on the server, but also to create a more complex interface where the user can navigate from a starting element and follow relationships without needing a full reload of the web page. DOT Language was used to generate graphs. Finally we designed a presentation language capable of generating a text based output, like html starting from an instance by displaying data from this instance and exploring related instances;

-The knowledge System (KS), consisting of tacit knowledge embodied by the individuals, and of explicit knowledge formalized and codified on any shape of supports. On (Grim-Yefsah et al., 2011) we have verified that: We could think that explicit knowledge is more easily transferable as it is teachable, codifiable, articulate. However, we have observed in reality, that even explicit knowledge is hard to learn and transfer due to limitations of explanation capacity (documents) and codification ability (IT). Inspired from Agile methods, we proposed four good practices:

(Good Practice 1) Organize global meetings (face-to-face) where -all- members of the outgoing and incoming service providers participate in order to discuss around the project and the documents, application and code transferred by the outgoing team; **(Good Practice 2)** The service provider (the IS department) has to participate to meetings; **(Good Practice 3)** Skipping the *Maintenance in cooperation* activity may have a negative impact on project knowledge transfer; **(Good Practice 4)** Plan to solve one or several ongoing incident(s) on the project during the *Maintenance in cooperation* activity.

EIKS is a Socio-Technical System for managing different types of knowledge in the transition stage of an outsourced information system development. The advantages of EIKS, as we conceived and developed it in the PSTI, help projects managers of client team for making proper condition between providers to share their knowledge more than before.

5 DISCUSSION AND CONCLUSIONS

This paper is an initial step towards understanding the transition stage in the context of an outsourced information system development (ISD). A search of literature reveals that there is very limited work published in this specific field. Our study inventoried tree case of transition stage of an outsourced ISD. Case1 concerns the first outsourcing; Case2 concerns the changing providers; Case3 concerns back-sourcing. We study especially the second case. On French Public Scientific and Technological Institutions who focus on their primary business, that is to say research and they outsource their support services as Information System development. We considered the transition phase of an outsourcing project, during which an outgoing service provider transfers the outsourcing project to an incoming service provider. The transfer not only concerns materials (documents and code) but also knowledge. Our study is grounded in the concept of knowledge, knowledge management and knowledge transfer process. Those concepts stream still have their merits. In fact, an Enterprise's Information and Knowledge System (EIKS), which is compounded on Digital Information System (DIS) and Knowledge system (KS), integrates people, both at the same time, as users and components of the system. EIKS is a Socio-Technical System.

So we find that the proposed Socio-Technical System (tool and good practices) have an influence on the transition performance, thereby, further improving our understanding of transition. We contribute to a better understanding of the importance of knowledge management related to managing explicit and tacit dimensions on the transition stage of an outsourced ISD. The system uses its own representation in its international functioning, then allowing a reduction in code writing need. This has a second benefice: bug detection is facilitated as most functions are used twice: For the international functioning; for working on the knowledge domain. Most programming mistakes would lead to a big bug preventing the system from performing any action, so it would be easily detectable and then easier to correct.

According on our application case and our experimentation, we considered the case of a simple outgoing arrangement (one to one contract for the outsourcing). A further research work should therefore be to study outsourcing with one client and several providers for eventually offshore outsourcing. We recommend to other organizations to use our proposed Socio-Technical System (tool and good practices) for case3: IT back-sourcing.

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